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RF Products
Microsemi
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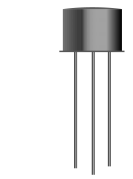
Jameco Part Number 140388

2N5109

RF & MICROWAVE DISCRETE LOW POWER TRANSISTORS

Features

- Silicon NPN, To-39 packaged VHF/UHF Transistor
- 1.2 GHz Current-Gain Bandwidth Product @ 50mA
- Maximum Unilateral Gain = 12dB (typ) @ 200 MHz



1. Emitter
2. Base
3. Collector

TO-39

DESCRIPTION:

Silicon NPN transistor, designed for VHF and UHF equipment. Applications include amplifier; pre-driver, driver, and output stages. Also suitable for oscillator and frequency-multiplier functions.

ABSOLUTE MAXIMUM RATINGS (Tcase = 25°C)

Symbol	Parameter	Value	Unit
V_{CEO}	Collector-Emitter Voltage	20	Vdc
V_{CBO}	Collector-Base Voltage	40	Vdc
V_{EBO}	Emitter-Base Voltage	3.0	Vdc
IC	Collector Current	400	mA

Thermal Data

P_D	Total Device Dissipation @ T_C = 75ºC (1) Derate above 25ºC	2.5 20	Watts mW/ ºC

Note 1. Total Device dissipation at T_A = 25ºC is 1 Watt.

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ELECTRICAL SPECIFICATIONS (Tcase = 25°C)

STATIC

(off)

Symbol	Test Conditions	Value			
		Min.	Typ.	Max.	Unit
BVCEO(sus)	Collector-Emitter Sustaining Voltage (IC=5.0 mAdc, IB=0)	20	-	-	Vdc
BVCER(sus)	Collector-Emitter Sustaining Voltage (IC = 5.0 mAdc, RBE = 10 ohms)	40	-	-	Vdc
ICEO	Collector Cutoff Current (VCE = 15 Vdc, IB = 0)	-	-	20	µA
IEBO	Emitter Cutoff Current (VEB = 3.0 Vdc, IC = 0)	-	-	100	µA

(on)

HFE	DC Current Gain (IC = 360 mAdc, VCE = 5.0 Vdc) (IC = 50 mAdc, VCE = 15.0 Vdc)	5 40	- -	- 120	- -

DYNAMIC

Symbol	Test Conditions	Value			
		Min.	Typ.	Max.	Unit
f_T	Current-Gain - Bandwidth Product (IC = 50 mAdc, VCE = 15 Vdc, f = 200 MHz)	-	1200	-	MHz

FUNCTIONAL

Symbol	Test Conditions		Value			
			Min.	Typ.	Max.	Unit
$G_{U\ max}$	Maximum Unilateral Gain (1)	IC = 50 mAdc, VCE = 15Vdc, f = 200 MHz	-	12	-	dB
MAG	Maximum Available Gain	IC = 50 mAdc, VCE = 15Vdc, f = 200 MHz	-	11.2	-	dB
$\|S_{21}\|^2$	Insertion Gain	IC = 50 mAdc, VCE = 15Vdc, f = 200 MHz	9.5	10.5	-	dB

Table 1. Common Emitter S-Parameters, @ VCE = 15 V, IC = 50 mA

f	S11		S21		S12		S22	
(MHz)	|S11|	∠ϕ	|S21|	∠ϕ	|S12|	∠ϕ	|S22|	∠ϕ
100	.082	167	6.77	87	.073	79	.347	-30
200	.255	172	3.56	71	.135	71	.259	-35
300	.288	132	2.39	61	.217	70	.247	-46
400	.298	137	1.91	50	.271	62	.216	-76
500	.368	126	1.61	41	.320	55	.172	-94
600	.404	121	1.38	33	.390	54	.174	-115
700	.462	116	1.28	27	.477	48	.163	-145
800	.503	110	1.21	18	.513	38	.190	176
900	.593	105	1.11	12	.535	33	.246	140
1000	.655	95	1.02	9.8	.604	35	.320	122

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RF Low Power PA, LNA, and General Purpose RF Discrete Selector Guide

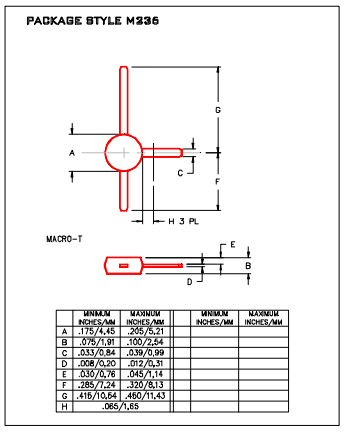
Package	Device	Type	GPE Freq (MHz)	Pout (watts)	GPE (dB)	Efficiency (%)	GPE VCC	BVCEO	IC max (mA)
SO-8	MRF4427, R2	NPN	175	0.15	18	60	12	20	400
TO-39	2N4427	NPN	175	1	10	50	12	20	400
POWER MACRO	MRF553	NPN	175	1.5	11.5	60	12.5	16	500
POWER MACRO	MRF553T	NPN	175	1.5	11.5	50	12.5	16	500
TO-39	MRF607	NPN	175	1.75	11.5	50	12.5	16	330
TO-39	2N6255	NPN	175	3	7.8	50	12.5	18	1000
TO-72	2N5179	NPN	200		20		6	12	50
MACRO X	MRF559	NPN	512	0.5	10	65	7.5	16	150
MACRO X	MRF559	NPN	512	0.5	13	60	12.5	16	150
TO-39	2N3866A	NPN	400	1	10	45	28	30	400
SO-8	MRF3866, R1, R2	NPN	400	1	10	45	28	30	400
POWER MACRO	MRF555	NPN	470	1.5	11	50	12.5	16	400
POWER MACRO	MRF555T	NPN	470	1.5	11	50	12.5	16	400
MACRO X	MRF559	NPN	870	0.5	6.5	70	7.5	16	150
MACRO X	MRF559	NPN	870	0.5	9.5	65	12.5	16	150
SO-8	MRF8372,R1,R2	NPN	870	0.75	8	55	12.5	16	200
POWER MACRO	MRF557	NPN	870	1.5	8	55	12.5	16	400
POWER MACRO	MRF557T	NPN	870	1.5	8	55	12.5	16	400

RF (Low Power PA / General Purpose) Selection Guide

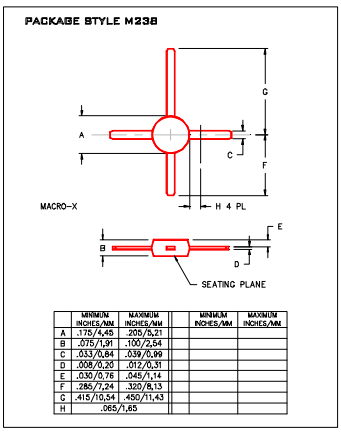
Package	Device	Type	Freq (MHz)	NF (dB)	NF IC (mA)	NF VCE	GN (dB)	Gu Max (dB)	Ftau (MHz)	Ccb(pF)	BVCEO	IC max (mA)
TO-39	2N5109	NPN	200	3	10	15		12	1200	3.5	20	400
TO-39	MRF5943C	NPN	200	3.4	30	15		11.4	1000		30	400
SO-8	MRF5943, R1, R2	NPN	200	3.4	30	15		15	1300		30	400
TO-72	2N5179	NPN	200	4.5	1.5	6		17	900	1	12	50
TO-72	2N2857	NPN	300	5.5	50	6		13	1600	1	15	40
TO-39	MRF517	NPN	300	7.5	50	15		5.5	4600	3	25	150
TO-72	MRF904	NPN	450	1.5	5	6		11	4000	1	15	30
TO-72	2N6304	NPN	450	5	2	5		14	1400	1	15	50
MACRO T	BFR91	NPN	500	1.9	2	5	11	16.5	5000	1	12	35
MACRO T	BFR96	NPN	500	2	10	10		14.5	500	2.6	15	100
SO-8	MRF5812, R1, R2	NPN	500	2	50	10	15.5	17.8	5000		15	200
MACRO X	MRF581A	NPN	500	2	50	10	14	15	5000		15	200
Macro	BFR90	NPN	500	2.4	2	10	15	18	5000	1	15	30
TO-72	BFY90	NPN	500	2.5	2	5		20	1300		15	50
TO-72	MRF914	NPN	500	2.5	5	10		15	4500		12	40
MACRO X	MRF581	NPN	500	2.5	50	10	15	17.8	5000		16	200
TO-39	MRF586	NPN	500	3	90	15	11	14.5	4500	2.2	17	200
MACRO X	MRF951	NPN	1000	1.3	5	6	14	17	8000	0.45	10	100
MACRO X	MRF571	NPN	1000	1.5	10	6	10		8000	1	10	70
MACRO T	BFR91	NPN	1000	2.5	2	5	8	11	5000	1	12	35
MACRO T	BFR90	NPN	1000	3	2	10	10	12.5	5000	1	15	30
TO-39	MRF545	PNP						14	1400	2	70	400
TO-39	MRF544	NPN						13.5	1500		70	400

RF (LNA / General Purpose) Selection Guide

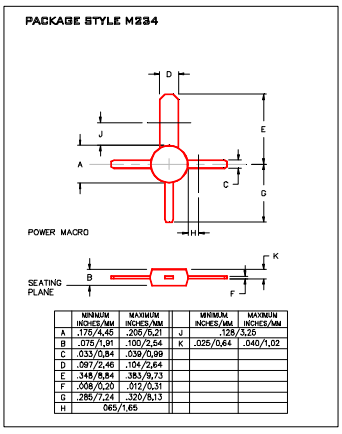
Low Cost RF Plastic Package Options



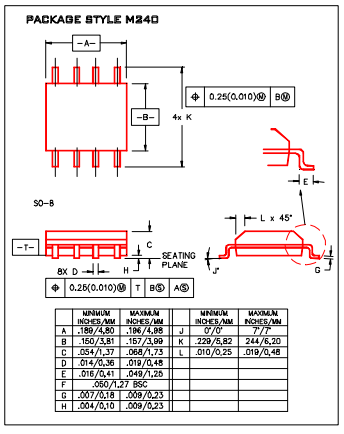
Macro T



Macro X



Power Macro



SO-8

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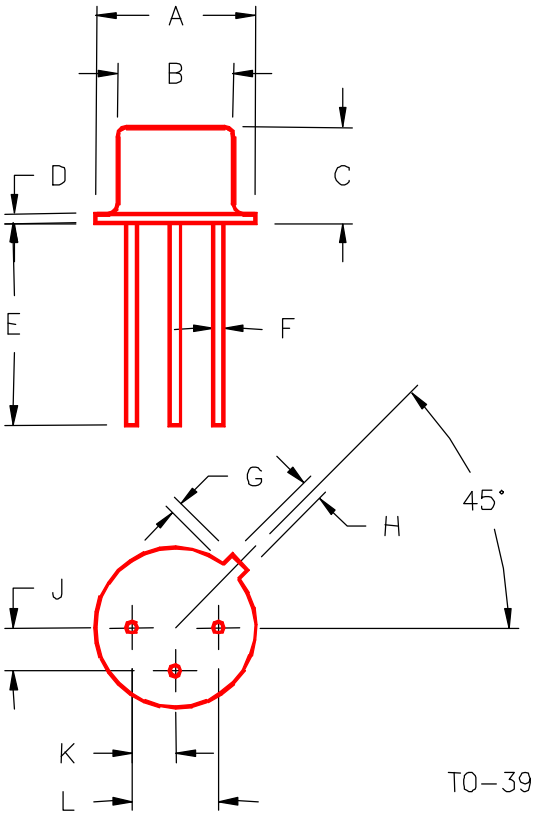
PACKAGE STYLE M246



	MINIMUM INCHES/MM	MAXIMUM INCHES/MM		MINIMUM INCHES/MM	MAXIMUM INCHES/MM
A	.350/8,89	.370/9,40	J	.095/2,41	.105/2,67
B	.315/8,00	.335/8,51	K	.095/2,41	.105/2,67
C	.240/6,10	.260/6,60	L	.190/4,83	.210/5,33
D	.015/0,38	.045/1,14			
E	.500/12,70				
F	.016/0,41	.019/0,48			
G	.029/0,74	.040/1,02			
H	.028/0,71	.034/0,86			